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The effects of progressive income taxation on job turnover

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Abstract

We examine whether the level of the income tax rate and the convexity of the income tax schedule affect job mobility, as measured by moving to a better job. While the predicted effect of the level of the tax rate is ambiguous, we predict that an increase in the convexity of the tax schedule decreases job search activity by taxing away some of the benefits of a successful job search. Using data from the Panel Study of Income Dynamics, we estimate that both higher tax rates and increased tax rate progressivity decrease the probability that a head of household will move to a better job during the coming year. Our estimates imply that a five-percentage-point reduction in the marginal tax rate increases the average probability of moving to a better job by 0.79 percentage points (a 8.0% increase in the turnover propensity) and that a one-standard-deviation decrease in our measure of tax progressivity would increase this probability by 0.86 percentage points (a 8.7% increase in the turnover propensity). This estimate is robust to sensitivity analysis examining the importance of different sources of identification and variation in estimated effects across subgroups in the population. Our estimated importance of tax policy for job turnover suggests a potential role in explaining the responsiveness of taxable income to marginal tax rates.

Keywords: Income tax rate; Income tax schedule; Job mobility

1. Introduction

A variety of models of promotion, efficiency wages, and job search predict that nonlinear payoffs create incentives for work effort. Empirical work on these models often

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focuses on specific groups of individuals, such as executives, rather than the general population. Differences in the nonlinearities in the tax system that households face provide variation that helps identify the responsiveness of labor market behavior (e.g., entrepreneurship, occupational selection, or effort) to nonlinear payoffs using the general population. In this paper, we analyze effects of nonlinear payoffs arising from nonlinearities in income taxation on job turnover.

The importance of job mobility for wage growth (see, e.g., Topel and Ward, 1992) suggests that our analysis may help explain the ''black box'' of research on the responsiveness of taxable income to marginal tax rates. As pioneered by Feldstein (1995), this research focuses on how tax rates affect the elasticity of taxable income, which summarizes a variety of behavioral responses to the tax system. This elasticity is an important policy parameter for both revenue estimates and the efficiency of the tax system. Feldstein and subsequent work by Auten and Carroll (1999) and Gruber and Saez (2002) analyze tax returns to focus specifically on taxable income. Effects of tax policy on taxable income capture a combination of such factors as hours worked, effort, reporting of income, and a variety of labor risk-taking activities. In contrast, we examine a specific behavior (job mobility) that should contribute to overall income growth, even if traditional measures of labor supply (i.e., hours worked) are unresponsive to tax rates.[1] Moreover, we allow for both the level of tax rates and the progressivity of the tax system to affect behavior.

Recent research in a variety of areas has pointed out that convexities in tax and transfer programs can have strong (and sometimes unintended) behavioral effects. For example, using simulation models, Hubbard et al. (1995) find that nonlinearities introduced by asset-based, means-tested social insurance programs help explain the low saving of low-income households; Gruber and Yelowitz (1999) find empirical evidence of these affects using data on Medicaid eligibility. For unemployment, Meyer (1990) finds that discontinuities in unemployment insurance benefits (e.g., the expiration of benefits) have large effects on the duration of unemployment.[2] Continuing in this line of argument, we emphasize the behavioral consequences of tax policy when uncertain returns to investments face a convex tax schedule.[3]

[1] The traditional approach to analyzing effects of taxes on labor supply (see Hausman, 1985) emphasizes how workers choose the number of hours to work when facing a nonlinear budget constraint. In addition to these traditional labor supply effects, we emphasize that that when the ''wage rate'' is uncertain, a nonlinear tax system can affect employment choices even for a given number of hours.

[2] Along with the fact that our methodology for measuring tax convexity takes the individual's current job as given, these substantial effects of the Unemployment Insurance system on search behavior lead us to focus on how the tax system affects movement from one job to another rather than mobility between unemployment and employment.

[3] Nonlinearities in rewards play a major role in incentive contracting models (see, e.g., Holmstrom and Milgrom, 1987; and the survey in Prendergast, 1999) in which principals offer managers (agents) a nonlinear compensation schedule to help align the manager's incentives with those of the principal. With an incentive contract, the agent's income increases when outcomes are good; in contrast, tax progressivity implies the opposite—the return to success is lower than it would be with less progressive taxes. While the theory of such contracts is well developed, empirical tests of these models have been limited (see, e.g., Prendergast, 1999; Himmelberg and Hubbard, 2000).

Using time-series and cross-sectional variation in tax schedules faced by households in the Panel Study on Income Dynamics (PSID) over the period from 1979 to 1993, our results imply that moves to better jobs are more likely when tax rates are low and the tax system is less progressive. Our estimates imply that a five-percentage-point reduction in marginal tax rates increases the probability that a head of household moves to a better job during the coming year by 0.79 percentage points (a 8.0% increase in the turnover propensity). We estimate that a one standard deviation decrease in our measure of tax progressivity faced by the household would increase this probability by 0.86 percentage points (an increase in the turnover propensity of 8.7%).

The paper is organized as follows. Section 2 presents theoretical predictions of how income taxes may affect job search with particular attention on the effects of progressive taxation. In Section 3, we discuss our empirical strategy for measuring the effects of tax progressivity on job search activity. Section 4 presents our empirical results, and Section 5 concludes with a discussion of the implications of our research and possible extensions.

2. Predictions of effects of income taxes on job search

Our empirical examination focuses on effects of income tax progressivity on the decision whether to change jobs. This work is part of a broader exploration of the effects of the tax policy on risk-taking (Gentry and Hubbard (2002a,b) study effects of tax progressivity on entry into entrepreneurship and wage growth, respectively). Our methodology for measuring tax incentives is better suited for studying job changes than issues associated with unemployment (e.g., search duration or reservation wages). Accordingly, we consider conventional "job search" as only one example of the effort an individual can exert to improve his or her future labor market opportunities. As a consequence, we are more interested in effects of the tax structure on human capital investment generally.[4]

In this context, Kesselman's (1976) model of tax effects on job search provides a useful starting point. He assumes that individuals divide their time between leisure, working, and

[4] This broader concern about human capital investment and our focus on job-to-job mobility contrasts with much of the analysis on search that focuses on how individuals set reservation wages, search duration, and the implications for unemployment (see, e.g., Blau and Robins, 1990 and the surveys in Mortensen, 1986; Mortensen and Pissarides, 1999). A substantial fraction of new employees come from switching jobs instead of from unemployment so the determinants of on-the-job search are important from the perspective of overall job turnover (see Pissarides and Wadsworth, 1994, for evidence on on-the-job search). Furthermore, for on-the-job search, social insurance programs are less relevant and the effects of the income tax on the offer distribution are relatively more important. If job mobility is driven by skills accumulation, then the emphasis of some search models on labor market frictions is less relevant. For example, if skills are static, in studying job-to-job mobility, one must ask why workers have not already found a good match in the labor market.

Despite our different emphasis, theoretical models of the traditional job search issues reinforce some of our predictions. Ljungqvist and Sargent (1995) Pissarides (1983, 1998, 2000), and Manning (2001) argue that an increase in tax progressivity will reduce unemployment by reducing the benefits to finding a better paying job which will reduce the reservation wage during a job search. Moreover, Manning conjectures that increasing the marginal tax rate is "likely to have an adverse impact on search intensity as it reduces the reward from higher-wage jobs".

searching.[5] The search component can be interpreted as networking for workers who frequently change jobs or, more generally, as a form of off-the-job training. This effort increases the wage rate for the time spent working and these returns to search effort are assumed to be certain. In this model (in which the tax system is taken to be linear), an increase in the marginal tax rate decreases the after-tax wage. The effect on search effort depends on whether labor supply decreases or increases with the change in the wage. For upward-sloping labor supply curves, the increase in the tax rate decreases search effort because the rewards to search are used less intensively. For the backward-bending portion of the labor supply curve, an increase in the marginal tax rate increases labor supply and search intensity. Kesselman also compares moving from a proportional income tax to a progressive income tax—defined as a flat marginal tax rate but with an income grant—holding revenue constant. The substitution effect from the decrease in the after-tax wage unambiguously reduces search effort.

Research on taxation and human capital formation (see, e.g., Eaton and Rosen, 1980) emphasizes the importance of considering the tax treatment of both the returns to human capital investment and the costs of the investment. A standard result in this line of inquiry is that a proportional tax will not affect human capital investment when the returns to the investment are certain if the cost of investment is deductible from the tax base, as would be the case when the cost of the investment is foregone wage income at the time of the investment. With uncertain returns, as pointed out by Eaton and Rosen, the effects of a change in the marginal tax rate are ambiguous due to an insurance effect (an increase in the tax rate reduces the riskiness of human capital investment, increasing such investment) and an effect on risk tolerance (the income effect from the tax change can affect individuals' willingness to bear risk depending on the preferences of the individuals). General human capital investments may be related to moves to better jobs (our primary dependent variable) because skills accumulation may lead to a promotion or improve the prospects from a job search.

Progressivity—marginal tax rates increasing with income—complicates the analysis of human capital investment. With certain returns, the after-tax cost of the investment depends on the foregone after-tax earnings, which depend on the nonlinearities in the tax system and the returns depend on the increased earnings after accounting for the potential increases in marginal tax rates. Progressive tax rates typically reduce the government's share of the cost of the human capital investment and increase its share of the returns, suggesting that, relative to a constant marginal tax rate, progressive tax rates reduce the incentive for human capital investment. Uncertainty exacerbates the problem; while it may be relatively straightforward to calculate the after-tax cost of the investment, the after-tax return depends on the uncertain return on the investment. (In the case here, the return may be zero if the search fails to find a better job or it may be large if the search provides a substantially better job.)

[5] Kesselman assumes a utility function over leisure and consumption that has equal disutility on working or searching so the time allocation problem has two stages. For any given amount of leisure, the individual allocates time between working and searching; given these allocations of time, the individual chooses the optimal bundle of leisure and consumption.

3. Empirical specification and data

To discriminate among potential effects of tax rates on job turnover, one would ideally want household-level panel data, with information on employment, job changes, and sufficient data to measure of income tax convexity across households and time. For a household, the relevant convexity of the income tax depends upon provisions of the tax code and a description of the ex ante distribution of payoffs to possible new jobs. That is, while households face a common tax code, they may have access to different job opportunities. Furthermore, the marginal tax incentives for job search depend on a household's location on the tax schedule.

In this section, we begin by describing our sample selection and our measures of job turnover. We then turn to the non-tax factors for job turnover that we include in our empirical model. Finally, we discuss our methodology for measuring the tax incentives for job turnover, both in terms of the level of the tax rate and the convexity of the tax schedule.

3.1. Choice of dependent variables and sample selection

The PSID provides information on employment, household income, and household characteristics. We use data over the period from 1979 to 1993. Our analysis starts with 1979 because the NBER TAXSIM model (our source for income tax variables) includes state tax code data starting in the late 1970s. It ends with 1993 because it is the last year for which final-release data are available. We use both the representative national sample and the low-income family sample but we use sample weights to avoid overweighting the low-income households.

Our sample conditions on being a head of household between the ages of 18 and 60 who is in the workforce in consecutive years with positive income in year *t*. We exclude the self-employed (in either year) to focus on transitions from working for one employer to another. The sample pools single men and women (and single parents) and married heads of households (almost always men). We exclude married women to avoid issues of the endogeneity of labor force participation. Our sample has 38,638 observations from 7424 distinct households.[6]

To focus on voluntary job mobility, we consider three dependent variables.[7] First, we consider whether the head of household moves to a better job during the year, which may or may not involve a change in employer.[8] For the years 1979 through 1984, the PSID asks individuals who change jobs during the year whether new job is better than the old job; for

[6] In defining a "household," we classify changes in marital status as a change in the household for the individual; over time, an individual can be part of different households.

[7] The PSID also asks whether the respondent has recently undertaken a job search. One problem with this as a measure of job mobility is that many moves to 'better' jobs (including many changes in employer) do not involve reported search behavior. Moreover, job searches may be predicated on unrealistic expectations about the prospects of finding a better job. Hence, we focus on actual job mobility.

[8] The job turnover variable is based on the respondent having a job in year t and year $t+1$ and having tenure in the year $t+1$ job of less than 1 year. This tenure variable is not available in the 1993 survey year. In addition, creating the job change variable requires data from a subsequent survey.

years 1985 through 1992, we define "better" as a voluntary change in jobs.[9] The inclusion of year effects subsumes differences in the average propensities for turnover created by using different questions in different years. In estimating the probability of changing jobs, we use explanatory variables from year t to predict whether a head of household changes jobs during the coming year.

Second, we consider whether the head of household changes employers during the year. This variable disregards changes of jobs in which the employer stays the same; for example, promotions within the firm are not considered job changes with this variable. While changing employer may more closely fit the idea of an employee searching for a new job, this variable misses labor market efforts associated with improving the probability of job mobility within the firm. Third, we examine the intersection of the first two dependent variables: changes in employer that are associated with a better job.

We estimate probit models of changing jobs (as defined above) between year t and year $t+1$, *TURNOVER*, by the head of household i during year $t+1$:

$$TURNOVER_{i,t+1} = f(x_{it}, z_{it}, \gamma_t) \tag{1}$$

where x_{it} are job characteristics of the individual's current job, z_{it} are household characteristics, and γ_t are year effects common to all households. We describe the explanatory variables below.

3.2. Non-tax factors influencing job mobility

Controlling for job and family characteristics is important for two reasons. First, these variables may capture factors, such as job stability or attachment, that affect job turnover. Second, as we describe below, our measure of the tax convexity depends on many factors, including household characteristics. Controlling for these characteristics reduces the probability of our estimated results being driven by spurious correlations among household characteristics, tax convexity, and the job mobility propensity.

As job characteristics, we include dummy variables for the worker's occupation, industry (both at the two-digit classification level in the PSID), and union membership status in year t, and the level and square of the labor earnings of the head of household in year t. We expect that workers with higher relative earnings will be less likely to change jobs. We also include a measure of job tenure based on the number of years in the current position. Job tenure may capture job attachment so it is likely to be negatively related to turnover or search. Royalty (1998) discusses the role of age and job tenure for turnover.

While the quadratic function of labor earnings controls for how current earnings affect turnover propensities (controlling for other demographic characteristics), the decision to look for another job may depend on current earnings relative to the earnings of similarly situated individuals. That is, to the extent that observable characteristics reflect earnings potential, the probability of being successful in searching for a new job depends on the

[9] Through 1987, the question regarding voluntary job changes is asked about changes in a worker's position (even if the employer stays the same). After 1987, the survey asks whether a change in employer is voluntary and whether the employee considers a change in a position with the same employer as a "promotion;" for these latter cases, we assume a "promotion" is a better job.

worker's current earnings relative to the earnings of similarly situated individuals. To capture relative earnings, we include a set of dummy variables to capture the worker's quintile in the real wage earnings distribution conditional on age (grouping heads of household by decade) and education (grouping workers using the five education categories described below). To calculate this relative earnings variable, we pool observations from all years of our sample.

For household characteristics, z, we include the number of children in the head is nonwhite, female, single, a homeowner, whether the household lives in a rural area (not resident in a Standard Metropolitan Statistical Area), and whether the head experienced a marital transition during the year (using separate variables for marriages, divorces, or the death of a spouse). We approximate educational status with indicator variables for "less than high school education," "some college," "college," and "some post-college education" (with the omitted category being a high school education). We control for

Table 1
Summary statistics

	Mean	Standard deviation	Minimum	Maximum
Job turnover to a better job	0.0987	0.298	0	1
Job turnover to any new job	0.194	0.396	0	1
Job search	0.0798	0.271	0	1
Marginal tax rate	29.17	10.16	− 19.86	69.45
Marginal tax rate convexity measure	2.95	3.12	− 14.78	26.31
Average tax rate	15.83	8.11	− 19.89	70.71
Average tax rate convexity measure	2.71	1.23	− 29.15	45.84
Head's labor earnings	26,108.62	19,478.05	50	550,000
Spouse's labor earnings	5782.34	9825.38	0	187,500
Dividend and interest income	776.34	2937.09	0	145,000
Other property income	625.76	4274.74	− 111,000	250,000
Age	37.75	10.77	18	60
Minority (non-white = 1)	0.143	0.350	0	1
Female head	0.229	0.420	0	1
Married (single = 1)	0.394	0.489	0	1
Number of kids	0.937	1.15	0	9
Job tenure (in years)	5.87	6.68	0	31.5
Union member	0.263	0.440	0	1
Homeowner	0.612	0.487	0	1
Rural	0.385	0.487	0	1
Less than high school	0.152	0.359	0	1
High school	0.376	0.484	0	1
Some college	0.207	0.405	0	1
College	0.187	0.390	0	1
Some post-college education	0.0787	0.269	0	1

Authors' calculations based on data from the PSID. Our sample pools data from 1979 to 1993. The number of observations is 38,638 except for job turnover that has 41,632 observations. The sample includes households for which the head works for someone else in year t and is not out of the labor force in $t+1$. We include only those households whose age is between 18 and 60 and whose labor income is positive in t. We drop all observations with average or marginal tax rates larger than 75% or smaller than − 20%. We also drop observations with average or marginal tax rates for the successful or the unsuccessful case larger than 75% or smaller than − 20%. The sample is weighted to reflect oversampling of low-income households.

the level and square of the spouse's labor earnings in year t, assigning values of zero to non-married households. We also include property income and dividend and interest income as proxies for wealth, which is not available on an annual basis in the PSID. Finally, we include Census-region-specific conditions; that is, we allow the year effects, γ_t, to vary by Census region. Table 1 provides summary statistics for the control variables.

3.3. Measuring the level of the tax rate

To construct tax variables, we use the TAXSIM model of the National Bureau of Economic Research (see Feenberg and Coutts, 1993). To estimate the household's predicted future marginal tax rate, we use household characteristics in year t and the year $t+1$ tax code.[10] From the PSID, we use household characteristics on family size, family structure, age, labor earnings, dividends, interest received, income from other sources (e.g., rental income), and state of residence.[11] To capture the effects of future wages exceeding current wages, we allow earnings to grow by 5% in constructing our benchmark tax rate. The benchmark tax rate captures the marginal incentive for effort at the current level of earnings. It also approximates the relevant marginal tax rate for deductible expenses associated with job search.[12] The TAXSIM model augments non-wage income by $100 to calculate average and marginal income tax rates. Because the tax rate schedules can have notches, TAXSIM occasionally produces unrealistic tax rates; we exclude observations for which TAXSIM produces tax rates that are below -20% or above 75%.

3.4. Measuring tax convexity

In addition to measuring job characteristics, household characteristics, and the level of the marginal tax rate, we face the more complicated task of adding measures of the curvature of the tax system. While the current tax rate facing a worker is a relatively easy concept to model, the convexity of the tax system that a worker faces is much harder to measure. To measure the curvature of the tax system, we need to know how tax rates depend on income and how wages might change in the future. Search theory predicts that

[10] The decision to look for a new job depends on longer-run consequences rather than just income over a short horizon. We use the near-term tax code for forming tax rates because households probably have a better idea of the near-term tax structure (either explicitly or implicitly through observing the after-tax living standards of households with differing levels of success) than of the actual future tax code when the steady-state outcome will be realized.

[11] We restrict our analysis to PSID observations that have these data items. Actual tax returns incorporate data that are not available from the PSID. For example, without interest payments and charitable contributions, we understate the number of households that itemize their deductions.

[12] As do most empirical studies of taxation, we assume that households know their tax rates and, moreover, can estimate their future tax rates. This information could come from either direct knowledge of the tax code or indirect observation of the after-tax living standards of other people. Fujii and Hawley (1988) test this assumption directly and find that households in the Survey of Consumer Finances underestimate their marginal tax rates; however, this bias is larger for homeowners which suggests (as Fujii and Hawley conclude) that the error may be the econometrician's rather than the respondent's since they assume that households take the standard deduction. In the end, whether households understand tax incentives is inherently an assumed hypothesis of testing whether they respond to such incentives.

someone will only accept a job offer if the new job is better than the old job; hence we base our measure of the relevant nonlinearities in the tax code on the distribution of wage growth conditional on wage growth being positive, which we define as a "successful job search." Neither the average tax rate at various outcomes nor the variance in tax rates faced over the distribution of outcomes are useful measures of the asymmetry in tax rates faced by potential job changers. Instead, we require a measure of the spread in tax rates that someone who changes jobs would face at various levels of success.

For measuring features of the income tax system, we rely on the NBER TAXSIM model. To compute our convexity measures, we repeat the TAXSIM tax rate calculations for alternative levels of income by replacing the head of household's labor income with some multiple of the original labor income (e.g., 110%, 125%, 150%, 200%, and 300% of labor income for the five levels of being successful).[13] Comparing these tax rates with the benchmark tax rate describes the shape of the tax schedule above the worker's current level of income.

The basic measure of tax convexity we use is the difference between the weighted average (using weights as derived below) of the marginal tax rates in the various successful states and the marginal tax rate in the benchmark outcome of wage growth of five percent. That is, how does the marginal tax rate change between good outcomes and the benchmark outcome? For someone facing a constant marginal tax rate over the range of possible outcomes, this measure of convexity is zero. If success changes the household's tax bracket, then the convexity measure is nonzero (and typically positive).[14]

To summarize the shape of the tax schedule above the current level of income, we need to combine the tax rates calculated from TAXSIM with information about how job search will affect wage income. Some previous research provides some guidance on the potential returns to search. The empirical analysis of Topel and Ward (1992) on job mobility indicates that job changes of young men are associated with an average wage increase of 10%.[15] Similarly, using stochastic frontier regression techniques, Hofler and Murphy

[13] We assume that the higher income is taxable. It is possible that some of the reward of the new job comes as untaxed compensation (e.g., fringe benefits). Moreover, the extent to which income takes a tax-advantaged form may depend on tax convexity and convexity may also affect tax planning effort. We cannot estimate the importance of such tax planning; however, we do base our convexity measure on the observed growth in reported wage income that would presumably be taxable.

[14] Our tax convexity measure for an individual depends on the household's location on the tax schedule. If households bunch just below kink points in the tax schedule, then relatively small increases in income would increase marginal tax rates. Saez (1999) finds some bunching below kink points but mainly for taxpayers with low levels of income. If this bunching is intentional, then one might argue that our measure of convexity is endogenous to household behavior. Without deliberate bunching, the distance from a kink point is a random household characteristic.

[15] One could directly examine the effect of job search or changing jobs on wage growth as indicators of the value of job search. However, conditioning on either of these variables has some disadvantages relative to just examining the overall distribution of wage growth. Conditioning on job search may select workers who perceive their current job to have low growth prospects; if their search does not yield a new job, then the low wage growth in their current job may downwardly bias the conditional distribution of wage growth relative to the distribution perceived when workers decide whether to search for a new job. Conditioning on an observed job change may mix the effects of voluntary job changes (which tend to increase income) and involuntary job changes (which may reduce labor income). Thus it is unclear whether these conditional wage growth distributions provide better information on the distribution of job prospects than the unconditional distribution provides.

(1992) estimate that, on average, workers earn wages that are approximately 10% less than what they would earn if labor market information was perfect and costless.

These papers focus on when employees change employers. In addition, as documented by McCue (1996), Olson and Becker (1983), and Le Grand and Tahlin (2002) for example, wage growth also depends heavily on 'internal' job mobility, such as promotions. Indeed Le Grand and Tahlin conclude that, for young workers (under age 35) in Sweden, internal mobility is more important than external mobility for earnings growth. Given the importance of internal mobility, our measure of returns to mobility should capture both internal and external mobility.

While previous research focuses on the average returns to job search, we take a broader view of the distribution of returns because we want to use various levels of possible success. To characterize how changing jobs affects a worker's relatively long-term earnings prospects, we examine the distribution of real earnings growth over a three-year period conditional on a head of household's age and education.[16] For our basic specifications, this distribution does not condition on changing jobs; in sensitivity analysis, we explore alternative methods of deriving these weights. We examine heads of households between the ages of 18 and 60 who were in the workforce in year t but that did not enter self employment between year t and year $t+1$. In calculating wage growth, we also condition on household heads having labor income of at least \$1000 in the first year (to avoid unreasonably large growth rates) and nonnegative labor income in year $t+3$.

Prospects for wage growth vary considerably by age and education level. To capture this heterogeneity, we calculate the three-year real wage growth distribution conditional on being in one of four age groups (less than 30, 30–39, 40–49, and 50–59 years old) and one of five education groups (described above). Thus we calculate the earnings growth distribution for each of 20 groups of households. For each group, we focus on households with positive wage growth to capture the benefits of search. To assign a weight to each of the five levels of success (10%, 25%, 50%, 100%, and 200% increases in real wage income), we form a histogram for each group. Each histogram calculates the percentage of households in the following real wage growth categories: (1) 0–15%, (2) 15–35%, (3) 35–75%, (4) 75–125%, and (5) greater than 125%. The percentage of households in each group is the weight that we use for each of our five levels of success (e.g., the fraction of households in the 0–15% growth range is the weight for 10% wage growth).

Across the 20 groups, the data imply the following average weights (the average is weighted by the number of households used in our base regression for each cell): (1) 0.421 on a 10% improvement; (2) 0.274 on a 25% improvement; (3) 0.176 on a 50% improvement; (4) 0.0653 on a 100% improvement; and (5) 0.0648 on a 200% improvement.

We formulate the levels of success by examining the change in real wage income over a three-year horizon. Several comments are in order. First, these growth rates are for the

[16] The choice of focusing on the three-year wage growth is, of course, arbitrary. We use these calculations simply to illustrate what changes in income potential job changers might reasonably expect to face. A shorter time horizon may yield low income if the worker has some time between jobs or high income if the worker earns extra funds during the transition (e.g., suppose changing firms carries a signing bonus); however, longer horizons reduce the amount of available data. We selected three years as an attempt to balance these competing concerns.

entire 3-year span; they are not annualized growth rates. Our assumption is that job changes are motivated by medium-term benefits rather than just the immediate impact of the job change. Second, because we are focusing on which tax rates matter conditional on success, our weighting scheme conditions on positive wage growth; the unconditional wage growth is obviously considerably lower. Third, we also assume that other types of income and demographics do not change with the decision to change jobs. For example, the wife's labor supply does not change when her husband changes jobs.

By using growth rates, we link the distribution of job change outcomes to current income by expressing the opportunities as percentage increases in current wage income.[17] The convexity measure assumes that each head of household within an age and education cell with the same labor earnings faces the same distribution of job offers. That is, other household characteristics do not affect the variance of the outcomes. An alternative approach would use draws from the earnings distribution conditional on characteristics such as age and education. We rejected this alternative because of the likely importance of unobservable characteristics as determinants of wage income. Using only observable characteristics to project wage growth would imply that someone with high unobservable ability (so that he or she is near the top of the wage earnings distribution for their age and education group) would have no incentive to change jobs.

Before presenting results on how convexity affects job turnover, some simple examples help illustrate our measure of convexity and clarify the sources of econometric identification for the convexity effects. Consider a family with one child that lives in a state without a state income tax; the 35-year-old husband with a high-school diploma earns $25,000, and the wife earns $15,000. In the 1986 tax code, this family faced a marginal tax rate of 28% and our convexity measure based on marginal tax rates for this household is 4.74 percentage points; by virtue of the reduction in tax brackets from the Tax Reform Act of 1986, such a family would face a marginal tax rate of 28% in 1988, but would have a convexity measure of only 0.27 percentage points. By 1992, such a family's marginal tax rate was 15%, and their convexity measure was 3.79 percentage points. Alternatively, consider a family in which the 35-year-old husband with an advanced degree earns $90,000, and the wife earns $50,000. For the years 1986, 1988, 1992, and 1993, such a family would face marginal tax rates of 49%, 33%, 31%, and 31%, respectively; however, the convexity measure would be 0.14, − 0.35, 0.71, and 3.19 percentage points, respectively. The increase in 1993 arises from the 1993 tax act that increased marginal tax rates on high-income families.

These examples reveal that convexity need not be positively correlated with the level of the tax rate or with income. Table 1 includes the basic summary statistics on the tax rate and convexity measures. The mean of the marginal tax rate spread is 2.95 percentage points and the median is 2.71 percentage points. The 5th, 25th, 75th, and 95th percentiles of the distribution of this measure of convexity are − 0.82, 0.75, 4.73, and 8.05 percentage points, respectively. Fig. 1 provides a histogram of the median upside convexity measure

[17] Our goal is to estimate the change in the level of wage income, not the change in the rate of growth income. By using percentage changes (as opposed to absolute dollar changes), we avoid the problem of a large absolute dollar increase for a low-income worker being a small percentage increase for a high-income worker (and vice versa).

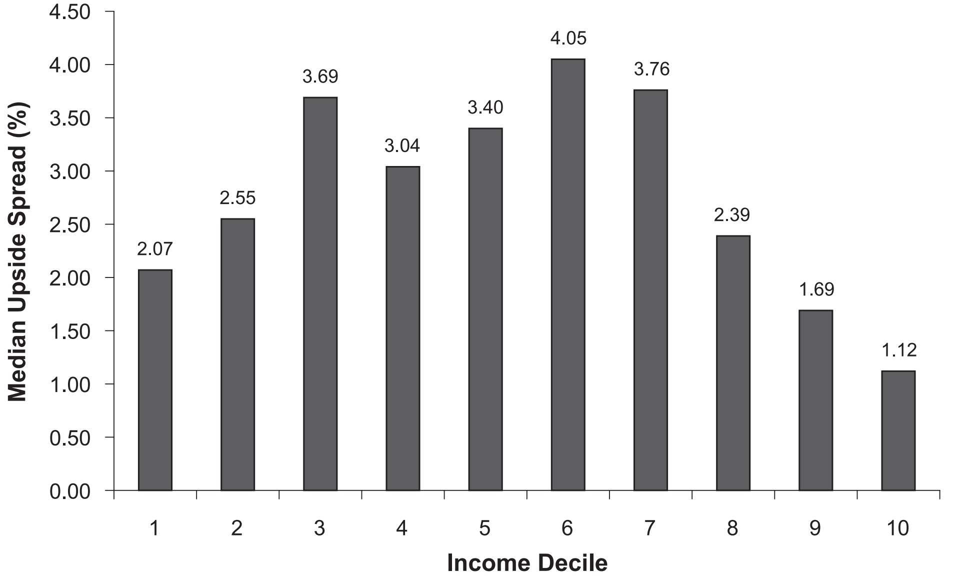

Fig. 1. Upside tax spread vs. income.

by annual income deciles. Middle-income households face the most tax convexity by our measure; for example, the sixth income decile has a median convexity measure of 4.05%. While convexity varies with income, it also varies within each income decile. For example, for the overall sample, the standard deviation of the convexity measure is 3.12 percentage points but within income deciles the standard deviation of the convexity measure ranges from 2.08 to 4.28 percentage points indicating that income is only one of the determinants of convexity.[18] Overall, the convexity depends on tax provisions that vary across households within a state, across similar households in different states, across time, and the distribution of income within the family.

4. Estimated effects of the income tax on job search

In this section, we present our empirical results, focusing on moves to better jobs. In particular, we discuss: (1) our basic specification for all households for several possible dependent variables; (2) sensitivity analysis to check the robustness of our results and inquire into the importance of different sources of econometric identification; and (3) variation in estimated effects across subgroups in the population.

[18] To get a sense of the variation within subgroups of the sample, as opposed to variation across groups, consider the percentage of the variation in convexity explained by grouping the data. Income decile effects, year effects for each Census region, and state effects explain 6.8%, 7.3%, and 0.9%, respectively, of the variation in convexity. Simultaneously controlling for these three characteristics explains 15.0% of the variation in convexity.

4.1. Basic specification

Table 2 presents the results for our basic specifications on the determinants of whether an employed person changes jobs during the next year. The three columns of results in Table 2 correspond to the three alternative dependent variables discussed above. The first column of Table 2 presents results for moving to a better job during the year. The estimated coefficient on the level of the tax rate of − 0.00158 is statistically significantly different from zero at the 99% confidence level. A five-percentage-point reduction in the marginal tax rate increases the probability of moving to a better job by 0.79 percentage points. Given that the average propensity to move to a better job is 0.0987 (i.e., 9.87%), this increase represents a 8.00% increase in the likelihood of job movement.

The estimated coefficient on the convexity of the tax system of − 0.00277 is statistically significantly different from zero at the 99% confidence level. In terms of economic significance, this estimate implies that a one-standard-deviation reduction in the marginal tax convexity measure (3.12 percentage points) would increase the turnover propensity by 0.86 percentage points. The average turnover propensity is 9.87%, so this

Table 2
Marginal effects estimated from probits on job turnover

	(1) Move to a better job	(2) Move to a new employer	(3) Move to a better job with a new employer
Tax rate on employment	− 0.00158 (0.000324)	− 0.00232 (0.000511)	− 0.000360 (0.000150)
Convexity in tax rate (spread)	− 0.00277 (0.000701)	− 0.00366 (0.00107)	− 0.000407 (0.000325)
Head's labor earnings	4.29 (2.87)	− 9.14 (4.85)	− 1.91 (1.50)
Head's labor earnings squared	− 0.877 (0.717)	1.57 (1.17)	0.0663 (0.340)
Spouse's labor earnings	7.53 (3.37)	1.02 (5.35)	0.970 (1.64)
Spouse's labor earnings squared	− 7.87 (5.77)	3.63 (9.08)	−0.988 (2.64)
Dividend and interest income	0.979 (0.692)	3.06 (1.03)	0.637 (0.292)
Other property income	− 0.478 (0.463)	4.09 (0.914)	0.346 (0.159)
Job tenure	− 0.00402 (0.00042)	− 0.00437 (0.000595)	− 0.00132 (0.000203)
Union member	− 0.0175 (0.00448)	− 0.0518 (0.00705)	− 0.00962 (0.00194)
Female head	0.00811 (0.00702)	− 0.0426 (0.0108)	− 0.00425 (0.00267)
Single (single = 1)	0.0105 (0.00586)	0.0224 (0.00996)	0.00431 (0.00267)
Less than high school	0.00121 (0.00615)	0.0385 (0.0106)	0.00484 (0.00298)
Some college	0.0162 (0.00547)	0.0262 (0.00927)	0.00397 (0.00256)
College	0.0152 (0.00788)	0.00696 (0.0125)	0.000556 (0.00326)
Some post-college education	0.0307 (0.0110)	0.0247 (0.0173)	0.00943 (0.00602)
Number of observation	38,638	38,161	37,795
Pseudo-R^2	10.73	9.96	18.45

Authors' calculations, as described in the text. Estimated models include Census-region effects by year, number of children, age dummies for 5-year age ranges for the head of household, dummy variables for wage-income quintile conditional on age-education cell, homeowners, minority status, marital transitions, and rural residents. Table 1 lists other sample restrictions. The estimated coefficients and standard errors for labor earnings are multiplied by 10^7 and for labor earnings squared are multiplied by 10^{12}. The estimated coefficients and standard errors for capital income and property income are multiplied by 10^6. The marginal effects are evaluated at the mean values of the variables; for the dichotomous variables, marginal effects are for changes from zero to one. Robust standard errors, clustered by household, are in parentheses. The regressions are weighted by sample weights.

effect is a 8.71% increase in probability of moving to a better job. These estimates suggest that the tax system affects job mobility, with both high tax rates and progressive tax rates reducing mobility.

The second column of Table 2 presents the results using moves to a new employer as the dependent variable. As with the results in the first column, the estimated effects of both tax variables are negative and statistically significant and the estimated coefficients are slightly larger in absolute value. In the third column, we present results using moves to a better job with a different employer as the dependent variable. With this alternative dependent variable, the estimated tax effects are smaller in absolute value; however, the mean propensity to move to a better job with a new employer is less than half as large as the propensity to move to a better job (4.29% of the observations versus 9.80%) which implies that the difference in the implied elasticities is smaller than the difference in the estimated coefficients. While the estimated effect of the level of the tax rate is statistically significant at the 99% confidence level, the estimated effect of tax convexity is not statistically significant. Thus, while convexity has a statistically significant association with moving to a better job or moving to a different employer, this estimated effect is not statistically significant for the combination of these two outcomes. To conserve space, in the sensitivity analysis below, we focus on moves to better jobs; in general, the sensitivity tests result in similar patterns across the different dependent variables as the patterns in Table 2.

The most important other explanatory variables are associated with increased job attachment—union membership, job tenure, and age. Based on the results in the first column, union members are 1.75 percentage points less likely to move to a better job and a 1-year increase in job tenure reduces the probability of moving to a better job by 0.40 percentage points. The (unreported) estimated effects of the various age ranges confirm that younger workers are more likely to change jobs. Education beyond high school is positively correlated with the turnover propensity. Conditional on other characteristics (including occupation and industry controls), the estimated effects of the income variables—wage earnings of the head and spouse, capital income, and the dummy variables for the real wage quintile—suggest only a modest relationship between current income and the propensity to move to a better job. In addition, the (unreported) estimated coefficients on the dummy variables for wage income quintiles conditional on age and education group are not statistically significantly different from zero.[19]

4.2. Sensitivity analysis and the sources of econometric identification

A number of statistical issues merit further investigation. First, for the results in Table 2, the sample pools all households which means that some of our econometric

[19] This result suggests that relative wages do not exert a strong effect (after controlling for the other observable demographic factors) on job mobility, which is consistent with the unobservable individual-specific characteristics being influential in job mobility. Interestingly, while the relationship between moving to a better job and relative wages is weak, we find a strong and monotonic relationship between relative wage income and self-reported job search activity with workers with lower relative wages being more likely to engage in on-the-job search.

identification comes from differences in the taxation of single individuals (male and female), single heads of households (male and female), and married (male) heads of households. To parse out the effects of using this heterogeneous sample, we estimate our basic specifications for the sample of married men.[20] The results for married men are broadly similar to the results for all households with two notable exceptions. First, for the first two dependent variables, the estimated tax effects are slightly larger in absolute value. Second, for job changes involving a different employer and a better job, the estimated effects are larger in absolute value and the estimated effect of tax convexity is statistically significant at the 95% confidence level.[21] This pattern holds for the remaining sensitivity analysis so we focus on the sample of all households for simplicity.

Second, interstate variation in income taxes is one source of econometric identification in our basic specification. It is possible that this variation in income taxes is correlated with other, omitted interstate variation in the search environment across states. Including state fixed effects removes the average time-invariant state-specific component to the labor market environment (but still allows intertemporal differences in state tax policy and cross-sectional intrastate variation in tax incentives to affect the estimated coefficients on the tax variables). Including state fixed effects to the specifications reported in Table 2 increases the magnitude (and associated statistical significance) of the estimated coefficients on both the level of the tax rate and tax convexity relative to the results without state fixed effects by roughly 20%. Thus it seems unlikely that the results in Table 2 are an artifact of spurious correlation with omitted state-specific characteristics of the job search environment.

Third, the intertemporal variation in income tax provisions is another source of variation that we use to identify the model. Our basic specification includes region-specific year effects that absorb the average difference across years. To examine the importance of intertemporal variation in tax incentives as a source of econometric identification, we estimate probits that allow the estimated tax effects to vary by year.[22] For these specifications econometric identification comes from differences in location on each year's tax schedule from both the head's earnings and other family-specific information (e.g., spousal income) and in the variation in state tax policy. We find no strong pattern in the estimated effects of the level of the tax rate. While the majority of the estimates of the convexity effect are negative, statistical significance is limited. Thus pooling the years is important for estimating the effects of convexity either because it increases the sample size or because it increases the variation in tax incentives.

Fourth, a common statistical problem in estimating the effects of tax policy on individual behavior is that the parameters of the tax system are correlated with income. Thus it is difficult to disentangle the effects of the tax system from nonlinearities in income

[20] To conserve space, we do not present these results in a table; these results, along with the other unreported results, are available upon request from the authors.

[21] More precisely, for this dependent variable, the estimated coefficient on the level of the tax rate is − 0.00486 with a standard error of 0.000160, and the estimated coefficient on the convexity of the tax system is − 0.00103 with a standard error of 0.000351.

[22] The specification interacts a year effect (that is not region specific) with the tax variables and the wage income variables.

effects. This problem is especially severe for the level of the tax rate because tax rates have a direct relationship with income. The problem is less severe for the convexity effect because convexity is not a simple function of income. We examine this issue by (1) estimating models with alternative functional forms for earnings controls, and (2) estimating the model with interactions between the tax parameters and a household's income quintile in the year of the observation. This second method (the results of which are discussed in Section 4.3) identifies the tax effects using the variation in the tax incentives for families within the same income quintile.

We use four alternative methods of controlling for labor income of the household head and the spouse: (1) using earnings of the husband and wife; (2) including a cubic function of labor earnings of the husband and wife; (3) using the logarithms of labor earnings; and (4) supplementing a quadratic function of earnings with dummy variables for the household's income decile formed from annual data. For all four specifications, the estimated effects of both the level of the tax rate and tax convexity on moving to a better job are negative and statistically different from zero at the 99% confidence level. For tax convexity, the estimated coefficients range from − 0.00253 to − 0.00274, which are quite similar to those found using a quadratic function of earnings. Overall, these alternative specifications indicate that the results are not sensitive to the functional form of the earnings control, suggesting that the results are not driven by a spurious relationship among job turnover, income, and the shape of the tax schedule.

Another area of concern is the measurement of tax convexity. We address two possible concerns with our measure of tax convexity in Table 3. First, tax progressivity can be

Table 3
Sensitivity to alternative convexity measures

	Tax rate on employment	Upside tax rate convexity	Pseudo-R^2
(1) Convexity measure based on average tax rates	− 0.00178 (0.000481)	− 0.00617 (0.00199)	0.107
(2) Weights on convexity measure are based on wage growth of all households	− 0.00161 (0.000321)	− 0.00313 (0.000730)	0.108
(3) Weights on convexity measure are based on wage growth within each wage income quintile	− 0.00142 (0.000337)	− 0.00181 (0.000666)	0.107
(4) Weights on convexity measure are based on wage growth within wage income quintiles conditional on age-education cell	− 0.00101 (0.000292)	− 0.000192 (0.000193)	0.106
(5) Weights on convexity measure are based on wage growth of heads of household that move to a better job	− 0.00171 (0.000327)	− 0.00306 (0.000666)	0.108
(6) Convexity measure defined as the difference in the convexity measure based on wage growth of heads of household that move to better jobs and the convexity measure based on wage growth of households that do not change jobs	− 0.00174 (0.000330)	− 0.0186 (0.00416)	0.108

Authors' calculations as described in the text. See also the notes for Table 2. Robust standard errors are in parentheses. The regressions are weighted by sample weights.

measured using either marginal or average tax rates. By using marginal tax rates at specific income levels, our measure focuses on the shape of the tax rate schedule over the relevant range of outcomes associated with job changes; for example, if a household remains in the same marginal tax bracket regardless of the job change, our measure of convexity will be zero. As an alternative measure of convexity, we replace our marginal tax rate measures with average tax rate measures. The level of the average tax rate replaces the level of the marginal tax rate; the spread between average tax rates for successful search and the benchmark income level replaces the marginal tax rate measure of convexity.[23]

The first row of Table 4 presents the results for the average tax rate measures of the level of the tax rate and tax convexity. The estimated coefficient on the level of the tax rate is − 0.00178, and the estimated coefficient on the average tax rate convexity measure is − 0.00617; both estimated coefficients are statistically significantly different from zero at the 99% confidence level.[24] A one-standard-deviation reduction in the average tax convexity measure would increase the probability of a job change by 0.76 percentage points, or 7.69% of the average turnover propensity.

Second, we examine whether how we choose the weights for our tax convexity measure affects the results. In our basic specification, the weights for the various positive outcomes from a job change vary across 20 groups, depending on the age and education level of the head of household. As alternative conventions for choosing the weights on different levels of success, we recalculate the histograms for three-year real wage growth conditioning on different groups of the population. Here we use four alternative conventions: (1) weights that are the same for all individuals; (2) weights that vary across quintiles in the distribution of real wage income; (3) weights that are based on the wage growth of heads of household that move to a better job; and (4) weights that vary by quintiles in the distribution of wage income that are constructed conditional on the age and education cell for the head of household (100 groups in all).

The second through fifth rows of Table 3 report the estimated effects of the tax variables for these four alternative weighting schemes. With one exception, basing the weights for constructing the convexity measure on these alternative weighting schemes yields similar estimated effects of the tax variables as to the results from our basic specification (i.e., the first column of Table 2). The one exception, presented in the fourth row of Table 3, is the case in which the weights are based on the head's wage income quintile conditional on his or her age and education, are somewhat different than the other cases. The estimated effect of the level of the tax rate drops to − 0.00101, and the estimated convexity effect drops to − 0.000192, and it is no longer statistically significant different from zero. One problem with this convention is that some of the weights are

[23] One problem with this alternative measure of convexity is that it incorporates features of the tax code that apply to incomes below the income associated with the current job; for example, reducing every household's tax liability (irrespective of income or employment status) by $500 would affect average tax rates but not marginal tax rates.

[24] The point estimates are larger when using the average tax rate measure of convexity; however, because the average tax rate measure has a lower standard deviation, the estimated effect of a one-standard-deviation reduction (1.23 percentage points compared to 3.12 percentage points) in convexity implies a slightly smaller effect on the expected rate of moving to a better job.

Table 4
Tax variables interacted with family characteristics on job turnover

	Marginal tax rate	Upside convexity
Panel A: income quintiles		
Lowest quintile	– 0.000333 (0.000487)	– 0.00106 (0.0115)
2nd quintile	– 0.00221 (0.000695)	– 0.00167 (0.0141)
3rd quintile	– 0.000407 (0.000626)	– 0.00219 (0.00146)
4th quintile	– 0.00295 (0.000684)	– 0.00511 (0.00149)
Highest quintile	– 0.00244 (0.000556)	– 0.00567 (0.00178)
Panel B: educational attainment		
Less than high school	– 0.000913 (0.000440)	– 0.00220 (0.00121)
High school graduate	– 0.00161 (0.000414)	– 0.00279 (0.00101)
Some college experience	– 0.00157 (0.000478)	– 0.00110 (0.00134)
College graduate	– 0.00227 (0.000559)	– 0.00496 (0.00167)
Post-college experience	– 0.00113 (0.000852)	– 0.00605 (0.00255)
Panel C: wage income quintile conditional on age-education cell		
Lowest quintile	– 0.000936 (0.000444)	– 0.00209 (0.00119)
2nd quintile	– 0.00164 (0.000709)	– 0.00266 (0.00153)
3rd quintile	– 0.00166 (0.000595)	– 0.00132 (0.00147)
4th quintile	– 0.00130 (0.000581)	– 0.00291 (0.00147)
Highest quintile	– 0.00251 (0.000579)	– 0.00521 (0.00155)

Authors' calculations, as described in the text. See also the notes for Table 2. Each panel reports estimates from a separate regression. The models also include the other covariates from the specifications in Table 2. The coefficients are marginal effects from probit estimated. Robust standard errors, clustered by household, are in parentheses. The regressions are weighted by sample weights.

formed using relatively small samples of individuals (e.g., fewer than 50) which leads to some weighting schemes that are implausible.[25]

The convexity measure in the fifth row of Table 3 uses weights based on the sample of households that move to a better job. One criticism of this specification is that, even without moving to a new job, individuals face some tax convexity. To address this concern that 'relative' tax convexity affects job mobility, we construct a measure of tax convexity based on the difference between the tax convexity measure used in the fifth row and a version of our tax convexity measure based on individuals who do not change jobs but who do experience positive three-year real wage growth. Since individuals who move to better jobs experience higher wage growth than those who do not change jobs, this measure of tax convexity places more weight on relatively large increases in wage income. The results from using this 'relative' measure of tax convexity are presented in the sixth row of Table 4. For the level of the tax rate, the results are similar to those in our basic specification. The estimated effect of tax convexity is negative and statistically significantly different from zero at the 99% confidence level.[26] Thus, even focusing on the tax

[25] For example, the maximum weight on a 200% increase in wage income is 0.59, which is almost four times larger than the maximum weight on such an increase in our base case, and the minimum weight on the smallest increase (10%) is 0.017, compared to a minimum weight of 0.239 in our base case.

[26] While the magnitude of the estimated coefficient is larger than in the other specifications, the mean level of measure of 'relative' tax convexity is only 0.74 percentage points compared to 2.95 percentage points for our base measure.

convexity implied by the difference in wage growth distributions of job changers and non-job changers, we find that tax convexity reduces job mobility.

While we cannot rule out that the weighting scheme affects our results, reasonable choices on dimensions along which to allow the weights to vary lead to similar results to our basic case. Thus we conclude on balance that our results are do not simply represent a spurious relationship based on our choice of weights for different levels of success.

4.3. Estimated effects within income, education, and relative wage groups

To ensure that our estimated effects of convexity are not driven by spurious correlations, we measure tax effects within income, education, and relative wage groups. The first panel of Table 4 presents an alternative identification strategy that focuses on the variation in tax incentives within each income quintile, by allowing the estimated tax effects to vary by income quintile. The specification controls for labor earnings using a quadratic specification and the other variables included in the main specification. The estimated effects of both the level of the tax rate and tax convexity on job changes are negative for all five income groups. However, statistically significant estimates are concentrated among the top two income quintiles. The size of the estimated effect of convexity increases with income, which suggests the sensitivity to nonlinear labor market payoffs may increase with income. In terms of determining the source of econometric identification, the negative effects within income quintiles suggest that the overall negative effect may not be driven by a spurious correlation between tax convexity and income; however, given the relatively low statistical significance for some of the coefficients, one cannot draw definitive conclusions from this test.

The second panel of Table 4 provides estimates for the tax effects within education groups. This specification tests whether the tax effects are concentrated among particular education groups. Again, for both the level of the tax rate and tax convexity, the estimated coefficients are uniformly negative. For the level of the tax rate, there is no pattern in the estimated effects. For convexity, the estimated effects are larger for better-educated groups.

As a third set of interactions, we examine whether the sensitivity to tax parameters depends on a head of household's wage income relative to the wage income of individuals of a similar education level and age. We interact the individual's relative wage income quintile conditional on age and education group with the tax variables. As discuss above, these dummy variables may be a proxy for the probability of finding a better paying job. While search theory predicts that relatively poorly placed individuals are more likely to search, it is less clear how the tax incentives will interact with relative wages. On the one hand, individuals with the lowest relative placement might want to search irrespective of the tax effects so that they would not respond to variation in the tax incentives; on the other hand, because individuals with low relative wage income may have a higher probability of finding a better job, they may be more responsive to changes in the after-tax rewards to changing jobs conditional on successfully finding a better job. Despite this ambiguity, allowing for the interaction allows us to check whether our primary results are driven by individuals in particular relative wage groups.

Panel C of Table 4 reports the results from interacting the tax variables with the relative wage income quintile. The estimated effects of both the level of the tax rate and tax convexity are consistently negative and typically statistically significantly different from zero at the 95% confidence level. While there is no strong pattern across the five groups, we find somewhat larger estimated effects of both the tax rate and tax convexity for the highest relative wage group.

5. Conclusion and directions for future research

This paper examines the effects of income taxes—both the level of the tax rate and the convexity of the tax schedule—on job changes. We find that individuals respond to differences in both the level of the tax rate and the convexity of the tax schedule. We estimate that a five-percentage-point reduction in the marginal rate at a worker's benchmark level of income increases the probability of moving to a better job by 0.79 percentage points (a 8.0% increase in the probability), and a 3.12-percentage point (i.e., a one-standard-deviation) decrease in our measure of convexity would increase the probability of moving to a better job by 0.86 percentage points (a 8.7% increase in the probability).

The effects of the convexity of the tax system on individual behavior are consistent with the findings of our work on the effects of the tax system on entry into entrepreneurship (Gentry and Hubbard, 2002a) and wage growth (Gentry and Hubbard, 2002b). For entry into entrepreneurship, arguably a much riskier decision with a broader spectrum of possible outcomes, we find that the convexity of the tax system has a relatively large, negative effect on the entry probability. Our work on wage growth is more closely related to job changes. While job changes are an observable labor market outcome, many other types of labor market effort are unobservable. We take the three-year real growth rate in wage income as a proxy for the cumulative effects of these various sorts of labor market effort. Consistent with our job turnover results, we find that a one-percentage-point decrease in upside tax convexity increases the three-year real growth rate in wages from 9.1% to 10.5% (a 15% increase).

Our results suggest an avenue, beyond the effects of marginal tax rate on the next dollar of income, by which income tax policy can affect individual behavior. A substantial body of research, to which we referred in the introduction, has focused on the elasticity of taxable income with respect to changes in the marginal tax rate. We contribute to this research program by suggesting that the measurement of the appropriate marginal tax rate for some types of behavior may incorporate elements of the tax schedule (e.g., marginal tax rates) other than the marginal tax rate at an initial income level. One possible direction for future analysis is to integrate the effects of tax convexity more directly into estimates of the elasticity of taxable income. The added complications of behavior that responds to tax rates over a broad spectrum of incomes also raises issues in calculating the deadweight loss of the tax system.

Our emphasis on the effects of nonlinearities in the tax system on behavior is consistent with labor market theories that nonlinear payoffs affect the effort decisions of individuals. When individuals keep a larger fraction of the rewards to a better job match, they are more likely to move to a better, higher-paying job.

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